

Claims

[c1] What is claimed is:

1.A method for optimizing normalized image log slope (NILS) of exposed lines of a lithography system comprising:

providing a photomask layout which is applied to an off-axis illumination (OAI) with an aperture of Quasar 90, the photomask layout comprising a first straight line and a second straight line parallel with the first straight line; and

adding a first assist pattern between the first and the second straight lines, the first assist pattern including a plurality of geometric patterns with similar sizes arranging along a first line direction which is parallel with the first straight line.

[c2] 2.The method of claim 1, wherein the first assist pattern divides a space between the first and the second straight lines into two equivalent areas.

[c3] 3.The method of claim 1, wherein the geometric patterns are square patterns.

[c4] 4.The method of claim 3, wherein a length of the square

patterns is approximately equal to a space between the first assist pattern and the first straight line and to a space between the first assist pattern and the second straight line.

- [c5] 5.The method of claim 1 further comprising adding a second assist pattern between the first straight line and the first assist pattern, the second assist pattern including a plurality of geometric patterns with similar sizes arranging along a second line direction which is parallel with the first straight line.
- [c6] 6.The method of claim 5, wherein a space between the second assist pattern and the first assist pattern, and a space between the second assist pattern and the first straight line are approximately equal to a space between the first assist pattern and the second straight line.
- [c7] 7.The method of claim 1 further comprising performing an optical proximity correction (OPC) to produce a corrected photomask layout before the step of adding the first assist pattern into the photomask layout.
- [c8] 8.A method for optimizing NILS of exposed lines of a lithography system comprising:
providing a photomask layout which is applied to an OAI with an aperture of Quasar 90, the photomask layout

comprising a plurality of straight lines parallel with each other; and

adding a plurality of assist patterns between the straight lines, each of the assist patterns including a plurality of geometric patterns with similar sizes arranging along a direction which is parallel with the straight lines, the assist patterns between any two of the straight lines approximately dividing a space between the two straight lines into a plurality of equivalent areas.

- [c9] 9.The method of claim 8, wherein an amount of the assist patterns added between any two of the straight lines is determined according to the space between the two straight lines.
- [c10] 10.The method of claim 8, wherein an amount and a width of the assist patterns added between any two of the straight lines are determined according to a numerical aperture (NA) of a lens of the OAI with the aperture of Quasar 90.
- [c11] 11.The method of claim 8, wherein a width of the assist patterns is determined according to a wavelength of the OAI with the aperture of Quasar 90.
- [c12] 12.The method of claim 8, wherein the wavelength of the OAI with the aperture of Quasar 90 is 248 nanometers

(nm).

- [c13] 13.The method of claim 12, wherein the NILS of the straight lines can be optimized to a value above 2.5.
- [c14] 14.The method of claim 12, wherein a space of the straight lines is about 180 to 250 nanometers.
- [c15] 15.The method of claim 14, wherein a line width of the straight lines is about 90 nanometers.
- [c16] 16.The method of claim 8, wherein the geometric patterns are square patterns.
- [c17] 17.The method of claim 16, wherein a length of the square patterns is approximately equal to a space between each of the straight lines and the adjacent assist patterns.
- [c18] 18.The method of claim 8 further comprising performing an OPC to produce a corrected photomask layout before the step of adding the assist patterns into the photomask layout.